Forest Service, United States Department of Agriculture

Allegheny Forest Experiment Station*



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Technical Note No. 10.



# EPICORMIC BRANCHING OF ALLEGHENY HARDWOODS

Selective logging or any method of partial cutting has been questioned by certain foresters because the trees left for future growth tend to "feather out" or produce what are known as "water sprouts" or epicormic branches. The table indicates the importance of this problem and is based on the results of the first 5-year period following controlled cutting on 3 one-acre sample plots and a check plot established in 1928 on Little Arnot Creek in the Allegheny National Forest. A description of these plots is given in Technical Notes 5, 6, and 7.

LITTLE ARNOT PLOTS - ALLEGHENY NATIONAL FOREST

(Living Trees 2.0" d.b.h. and over on Plots in 1932)

| | Check Plot #2 12.2%1/ of B.A. cut2/ | | | Selective Plot #1 61.2%1/ of B.A. cut | | | Diam. Limit Plot #3 65.7%1/ of B.A. cut | | |
|---|---|---|---|---|---|---|---|---|---|
| Species | % with epicormic branches | av. clear length(ft.) 1928 | 1932 | % with epicormic branches | av. clear length(ft.) 1928 | 1932 | % with epicormic branches | av. clear length(ft.) 1928 | 1932 |
| Sugar maple | 3/ 30 | 20 | 7 | 45 | 23 | 10 | 77 | 26 | 12 |
| Red maple | 9 | 27 | 14 | 63 | 36 | 12 | 100 | 30 | 9 |
| Yellow birch | 4/ 0 | | | 52 | 37 | 26 | 86 | 32 | 14 |
| Black birch | 0 | | | | | | 83 | 34 | 27 |
| Beech | 17 | 23 | 7 | 0 | | | 40 | 26 | 8 |
| White ash | 0 | | | 33 | 41 | 21 | - | | |
| Black cherry | 0 | | | 54 | 45 | 22 | - | | |
| Basswood | 11 | 27 | 21 | 80 | 35 | 10 | | | |
| Shadbush | 5/ - | | | | | | | | |
| Hop hornbeam | | | | | | | 0 | | |
| Yellow poplar | - | | | | | | | | |
| Cucumber magnolia | - | | | | | | | | |

1/ Percentage of total basal area removed.

2/ Cutting done unavoidably prior to plot establishment.

3/ Percentages underlined are based on fairly reliable numbers of trees.

4/ Percentages not underlined are based on too few trees to be more than indications.

5/ Species present in very small numbers indicated by dash.

*Maintained at Philadelphia, Pennsylvania in cooperation with the University of Pennsylvania.

On the fourth sample plot, which was clear-cut for sawlogs and chemical wood, 6 isolated basswood were left. All produced epicormic branches and have declined in vigor since exposure, (in 4 trees the entire top has died). The average clear length has dropped from 26 to 4 feet.

The table reveals that the percentages of trees with epicormic branches are greater on Plots 1 and 3, where logging created larger openings in the crown canopy, than on the check plot #2. It is incorrect, however, to ascribe epicormic branch formation to increased light and growing space alone, since four of the species on the check plot are also affected. The exact physiological cause of dormant bud stimulation, or production of branches from adventitious buds, is not known to science. Observation indicates that "agony shoots" are common on trees about to die as well as on those growing vigorously. Many small suppressed sugar maple and some beech died between 1928 and 1932 on the check plot; the drought of 1930 was doubtless a factor in reducing the vigor of these slow-growing trees and production of epicormic branches resulted. The absence of release, as shown by a crown map, gives assurance that this branching was not due to a border cutting or the slight removal of crown canopy on this plot.

Detailed analysis of individual tree records has failed to show consistent differences between trees with epicormic branches and those without. The average diameter and diameter growth, crown class, relative release, vigor, and bole defects, were quite similar, for a given species and plot, in the two groups. In certain cases epicormic branching is evidently due to loss of the top through breakage, girdling or die-back; its function is to replace the damaged part. Inadequate flattened crowns, characteristic of suppressed and intermediate trees, may similarly result in epicormic branch formation, whether the tree is released by cutting or left in a closed stand.

Data secured five years after these plots were established show that epicormic branches have greatly reduced the clear length of all species. The size of these branches is $\frac{1}{4}$ to 1 inch in diameter at the point of attachment, with the average size $\frac{1}{2}$". Once stimulated to develop it is evident that conditions for increase in size and persistence of epicormic branches would be better on the more open plots. Trees producing scanty or no epicormic branches are usually characterized by adequate crowns, were dominant or codominant prior to the cutting, averaged larger in diameter, and were more rapid in diameter growth, than trees with abundant or medium branches. White ash is relatively free of this defect, and, if full crowned trees are reserved in a selective cutting, few epicormic branches will develop.

Additional data on the size, persistence and future abundance of these branches will be obtained in future plot measurements. Permanent loss of tree quality will only result should these epicormic branches remain healthy, grow to larger size, and fail to be shaded out in the future.

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